

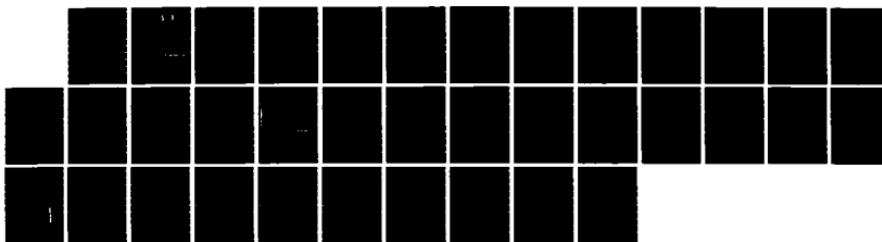
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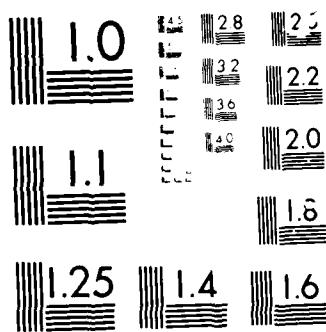
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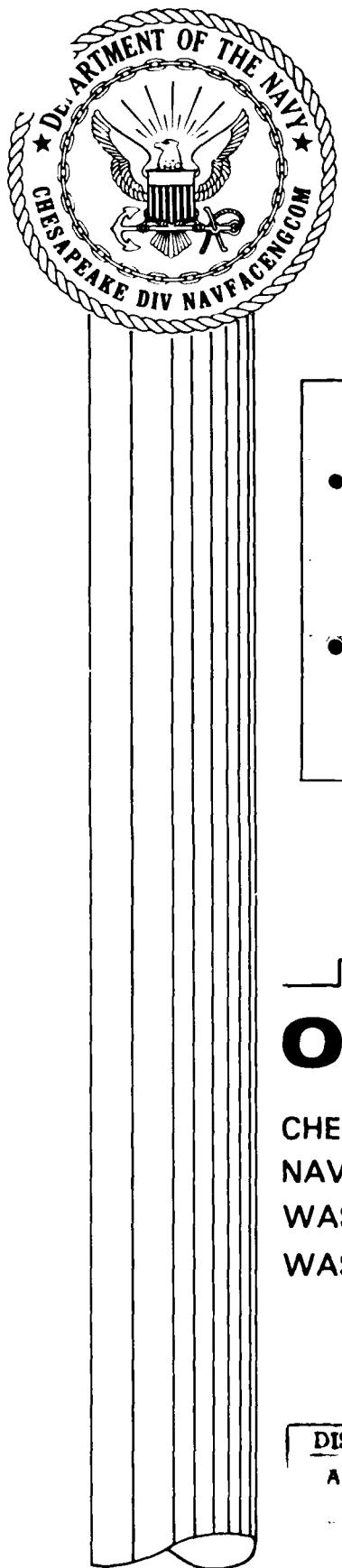




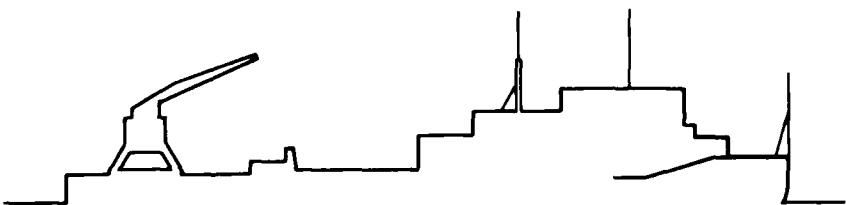
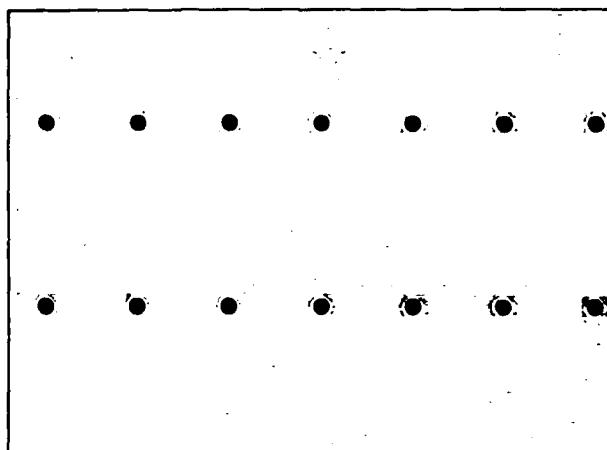
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CHESAPEAKE DIVISION  
NAVAL FACILITIES ENGINEERING COMMAND  
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CABLE REPAIR PROJECT

PMRF BARKING SANDS

FEBRUARY 1986

FPO-1-86(8)

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During the summer of 1985 Chesapeake Division, Naval Facilities Engineering Command (CHESNAVFACENGCOM) executed the UQC Repair/Replacement Cable Installation Project at Barking Sands Tactical Underwater Range (BARSTUR) Pacific Missile Range Facility (PMRF) on the island of Kauai, Hawaii. (Con't)

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The plan was to lay three cables through the three conduits of the UQC concrete groin in the surf zone. Due to excessive sand and rubble over and around the groin only one cable was successfully pulled through one of the conduits of the groin. The other two cable were laid outside the groin and protected with split pipe.

The purpose of the UQC Sea/Shore Interface Cable Repair is to place the three split pipe encased cables in a trench through the bedrock and fill the trench with concrete.

## TABLE OF CONTENTS

Section	Page
EXECUTIVE SUMMARY.....	iv
I. PROJECT DESCRIPTION.....	1
- Background.....	1
- Scope of Work.....	1
II TASKING RESPONSIBILITIES.....	4
- Project Tasking.....	4
III WORK BREAKDOWN.....	5
1.0 TECHNICAL SUPPORT.....	5
1.1 Engineering Design.....	5
1.1.1 Prepare Plans and Specs Trench.....	5
1.1.2 Design Trench Covers.....	5
1.1.3 Prepare Design Drawings.....	5
1.2 Project Execution Plan.....	6
1.3 Support of Field Operations.....	6
1.3.1 Material Equipment Staging.....	6
1.4 Project Completion Report.....	6
2.0 LOGISTICAL SUPPORT.....	7
2.1 UCT-2 Equipment/Material.....	7
2.1.1 Requirements.....	7
2.1.2 Transportation Management.....	7
2.1.3 Refurbishment.....	7
2.2 PMRF Barking Sands Kauai, Hawaii.....	8
3.0 PROJECT CONSTRUCTION OPERATIONS.....	9
3.1 Trenching.....	9
3.2 Steel Trench Covers.....	9
4.0 PROJECT MANAGEMENT.....	11
4.1 Project Command and Control.....	11
4.2 Project Responsibilities.....	11
4.2.1 CHESNAVFACENGCOM FPO-1.....	11
4.2.2 UCT-2.....	11
4.2.3 PMTC/PMRF Barking Sands, Kauai, Hawaii.....	13
4.3 Personnel Assignments.....	14
IV CONSTRUCTION OPERATIONS PLAN.....	15
1.0 Operational Procedures Overview.....	15
1.1 Pre-Construction Operations Requirements.....	15
1.1.1 Steel Trench Covers.....	15
1.2 Construction Operations.....	17
1.2.1 Moving Split Pipe.....	17
1.2.2 Trenching.....	17
1.2.3 Setting Reinforcing Steel in Trench.....	19
1.2.4 Preparation of Trench Covers.....	19
1.2.5 Placement of Trench Covers.....	22
1.2.6 Trench End Covers.....	22
1.2.7 Concreteing in Trench with Covers.....	25
1.2.8 Concreteing in trench without covers.....	25
V EXECUTION SCHEDULE	
Appendix A Project Equipment.....	26
Appendix B Project Personnel.....	27

LIST OF FIGURES

FIGURE	DESCRIPTION	PAGE
Figure #1	Detail of Groin and Nearshore Cable.....	2
Figure #2	Trench Cover Usage.....	10
Figure #3	Installation and Operations Organization.....	12
Figure #4	Trench Covers.....	16
Figure #5	Trench Routes.....	18
Figure #6	Rock Bolts Installation.....	20
Figure #7	Re-Bar Configuration in Trench.....	21
Figure #8	Trench Covers Immobilization.....	23
Figure #9	Trench End Cover Assembly.....	24

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EXECUTIVE SUMMARY

During the summer of 1985 Chesapeake Division, Naval Facilities Engineering Command (CHESNAVFACENGCOM) executed the UQC Repair/Replacement Cable Installation Project at Barking Sands Tactical Underwater Range (BARSTUR) Pacific Missile Range Facility (PMRF) on the island of Kauai, Hawaii. (PMRF Special Project R51-85).

The plan was to lay three cables through the three conduits of the UQC concrete groin in the surf zone. Due to excessive sand and rubble over and around the groin only one cable was successfully pulled through one of the conduits of the groin. The other two cable were laid outside the groin and protected with split pipe.

The purpose of the UQC Sea/Shore Interface Cable Repair is to place the three split-pipe encased cables in a trench through the bedrock and fill the trench with concrete.

## I. PROJECT DESCRIPTION

### BACKGROUND

The UQC cables are essential components of the BARSTUR; they provide two-way communication capabilities between the offshore range and the tracking control operations facility onshore. Five inshore cables are associated with the UQC system; three of which are connected to UQC transducers, the other two are spares. The three cables laid during the UQC Repair/Replacement Cable Installation Project are encased in split pipe at the sea/shore interface where corrosion and sand abrasion deteriorate the cast iron quickly. The split pipe encased cables require adequate long term protection in this harsh area. Two cables, UQC #1 and UQC South Spare, lay outside the groin to the south of the concrete encasement. UQC North Spare runs through the north conduit of the seaward portion of the concrete encasement (groin). Figure 1 shows the pre-construction location of the cables.

### SCOPE OF WORK

Two trenches will be cut into the bedrock, one trench approximately 110' feet in length is for both UQC #1 and UQC South Spare. The other trench about 70' in length is for UQC North

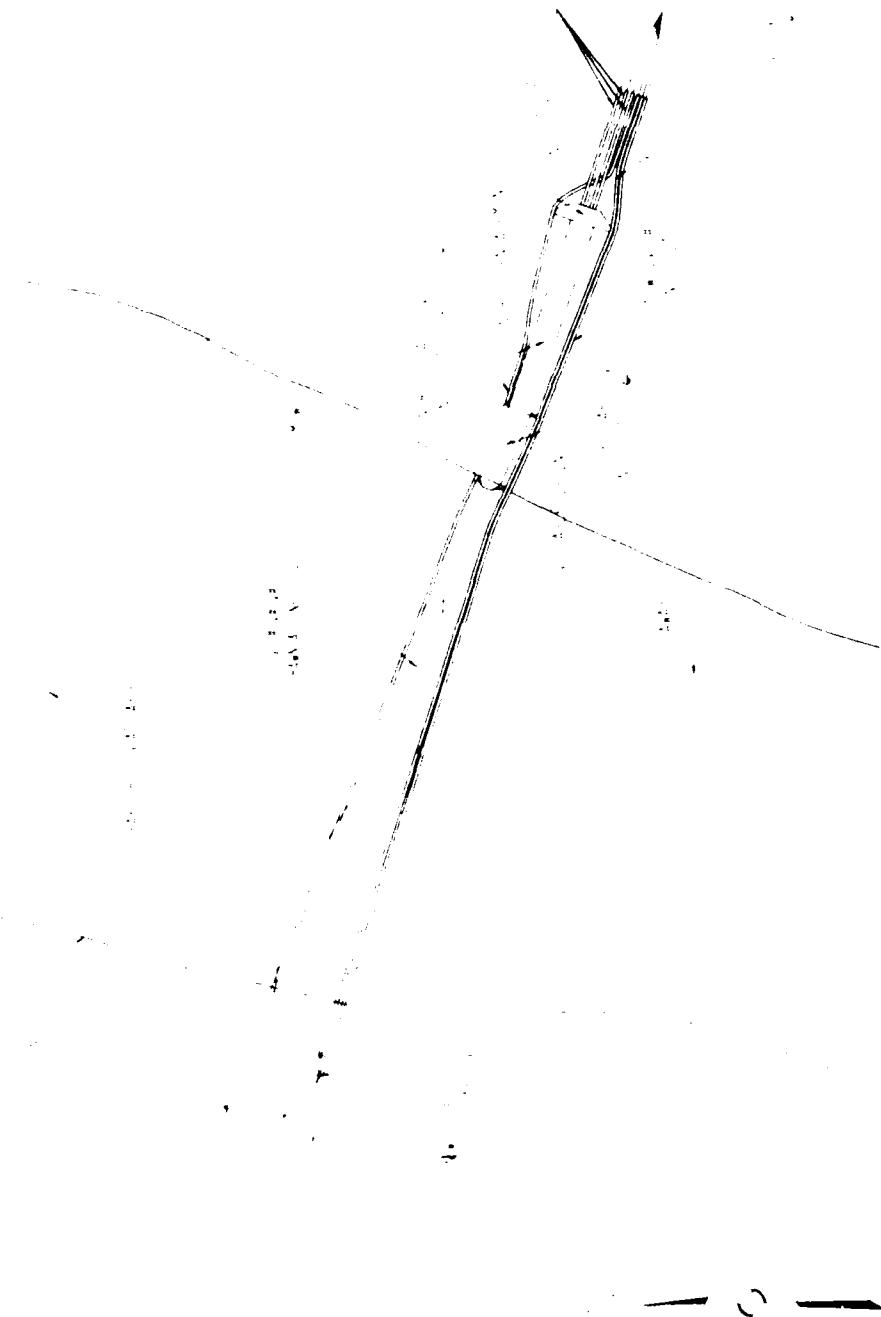


Figure 1. Detail of Groin and Nearshore Cable

Spare. The cables will be set in the trench and the trench back filled with concrete to protect the split pipe encased cables from sand abrasion in the surf zone where water borne sand particles erode the cast iron and corrosion in the splash zone where the cast iron is alternately wetted and dried and to immobilize the cables from movement induced by the high surf.

II. TASKING RESPONSIBILITIES

**PROJECT TASKING**

Chesapeake Division was assigned responsibility to execute the UQC Repair/Replacement Cable Installation Project at BARSTUR PMRF, Kauai, Hawaii. UCT-2, Port Hueneme, California was tasked by CINCPACFLT as the construction agent.

The UQC Sea/Shore Interface Cable Repair Project is a continuation of the original tasking. CHESNAVFACENGCOM was assigned responsibility for project execution and providing logistics, planning and engineering support. Organizational responsibilities for the execution of project functions are outlined in the work breakdown structure Section III.

PMRF will provide logistical support at the site and provide necessary materials and equipment support.

III. WORK BREAKDOWN

1.0 TECHNICAL SUPPORT

1.1 Engineering Design

1.1.1 Prepare Plans and Specifications for Trench  
Responsibility - CHESNAVFACENGCOM FPO-1

Execution - CHESNAVFACENGCOM FPO-1

Task - Identify trench route and dimensions and pass  
requirements to Public Works, PMRF

1.1.2 Design Trench Covers

Responsibility - CHESNAVFACENGCOM, FPO-1

Execution - CHESNAVFACENGCOM, FPO-1

Task - Design the trench covers to be installed.

1.1.3 Prepare Design Drawings

Responsibility - CHESNAVFACENGCOM, FPO-1

Execution - CHESNAVFACENGCOM, FPO-1

Task - Prepare shop drawings to allow UCT 2 to fabricate  
trench covers on site

1.2 Project Execution Plan

Responsibility - CHESNAVFACENGC0M FPO-1/UCT-2

Execution - CHESNAVFACENGC0M, FPC 1

Task - Prepare Project Execution Plan for UQC Sea/Shore  
Interface Cable Repair Project with input from UCT-2

1.3 Support of Field Operations

1.3.1 Material Equipment Staging

Responsibility - CHESNAVFACENGC0M, FPO-1 Project  
Engineer/UCT-2/PMRF

Execution - UCT-2/CHESNAVFACENGC0M, FPO-1/PMRF

Task - All equipment and material not provided by PMRF to  
support the project will be shipped to PMRF, Kauai, Hawaii.  
Appendix A shows a list of equipment and responsibilities.

1.4 Project Completion Report

Responsibility - CHESNAVFACENGC0M, FPO-1

Execution - CHESNAVFACENGC0M, FPO-1

Task - Prepare project completion report

## 2.0 LOGISTICAL SUPPORT

### 2.1 UCT-2 Equipment/Material

#### 2.1.1 Requirements

Responsibility - Commanding Officer (CO) UCT-2; Task - Based on scope of project, identify those UCT-2/Naval Construction Forces (NCF) equipments/material required for project execution. Coordinate the delivery of these equipment to meet project schedules. UCT-2 assets to be used on the project are listed in Appendix A.

#### 2.1.2 Transportation Management

Responsibility - Commanding Officer (CO) UCT-2; Execution - UCT-2/CBC Port Hueneme, California; Task - Prepare for transportation and coordinate the movement and delivery of the UCT-2/NCF equipment and material required for the project execution.

#### 2.1.3 Refurbishment

Responsibility - UCT-2; Execution - UCT-2/CBC Port Hueneme, California; Task - Initiate necessary action to repair, refurbish and restore to an as-issued condition (normal wear-and-tear expected) UCT-2/NCF equipment used during the project execution. Return transportation and storage to be funded under the project TAC number.

2.2 PMRF Barking Sands Kauai, Hawaii

Task - Provide equipment as outlined in Appendix A. Coordinate the delivery of these equipment to meet project schedules. Provide the following logistic support services during execution of UQC Sea/Shore Interface Cable Repair Project: berthing and messing for UCT-2 personnel, fuel and maintenance assistance as required for vehicles and equipment used on the project, naval message and telephone communications support, supply and acquisition support to provide for unforeseen spare parts and material requirements and provide concrete as needed on site.

### 3.0 PROJECT CONSTRUCTION OPERATIONS

#### 3.1 Trenching

Trenches will be cut into the bedrock adjacent to the existing split pipe encased cables. The trench characteristics were determined at CHESNAVFACENGC0M and are discussed in Section 1.2.2 and graphically shown in Figure 7. PMRF through its base support contractor will contract for the trenching and the CHESNAVFACENGC0M project engineer will provide technical direction on site.

#### 3.2 Steel Trench Covers

The trench covers were designed at CHESNAVFACENGC0M. The trench covers will be used only in the area as shown in Figure 2 where the waves would cause mixing and separation of concrete in the trench if trench covers were not used. The trench covers will be placed on top the trench, and immobilized to the bedrock. Concrete will be placed in the void space between the split pipe in the trench and covers over the trench. In the area shoreward of where trench covers are used the concrete will simply be poured in the trench.

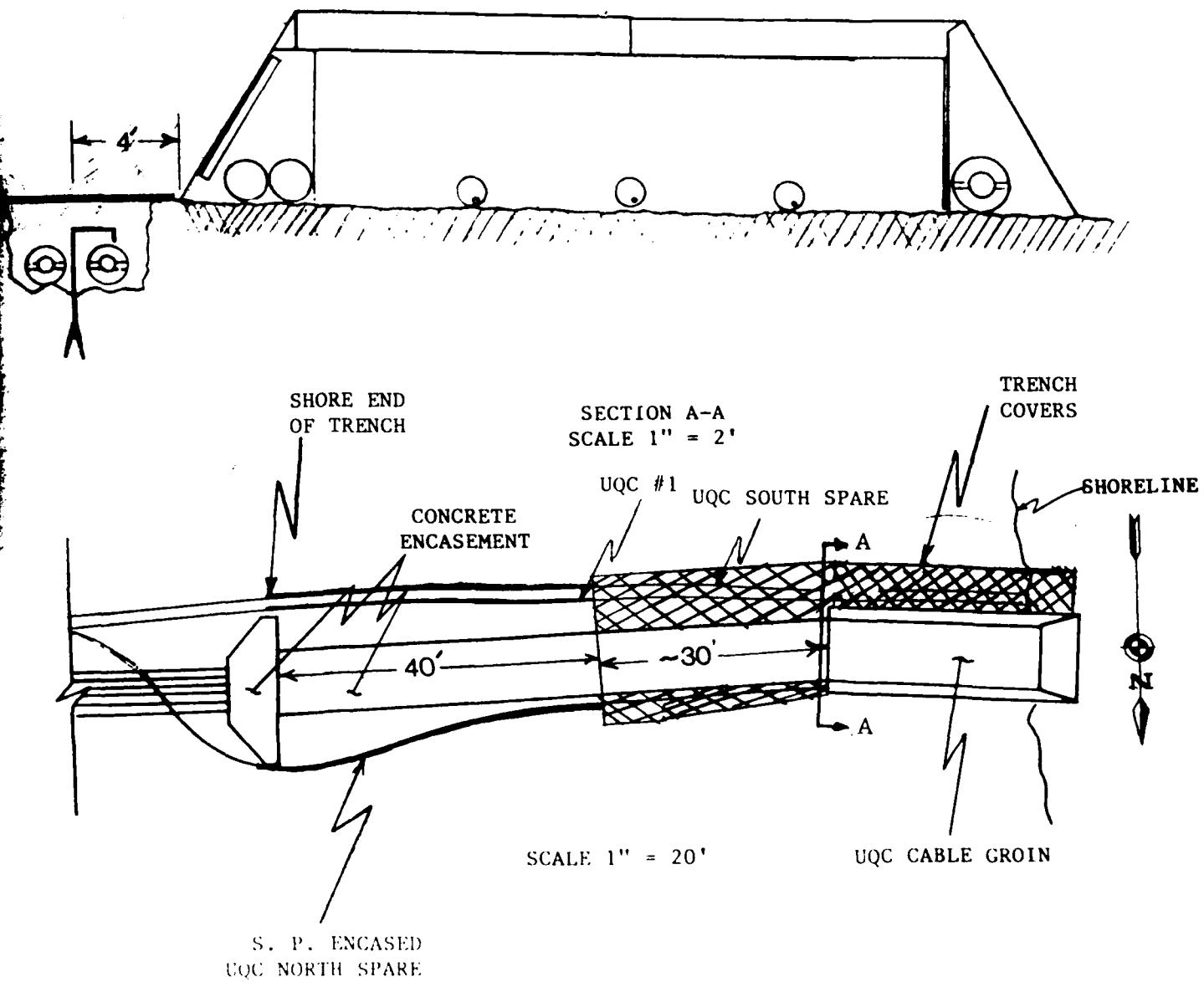


Figure 7  
UQC CABLE GROIN  
Trench covers - as form-shaded section Only

## 4.0 PROJECT MANAGEMENT

### 4.1 Project Command and Control

The structure of project command and control for the UQC Sea/Shore Interface Cable Repair Project is illustrated in Figure 3.

### 4.2 Project Responsibilities

#### 4.2.1 CHESNAVFACENGCOM FPO-1

- \* Provide overall project management for UQC Sea/Shore Interface Cable Repair Project
- \* Provide project logistics, planning and engineering support and coordination for the UQC Sea/Shore Interface Cable Repair Project
- \* Provide rock bolts, and reinforcing steel
- \* Provide equipment transportation for all CHESNAVFACENGCOM assets used in the project
- \* Prepare project completion report including as-built drawings

#### 4.2.2 UCT-2

- \* Provide project OIC
- \* Layout, identify and provide all equipment required to encase the UQC cables
- \* Transport military personnel as listed in Appendix B to job site

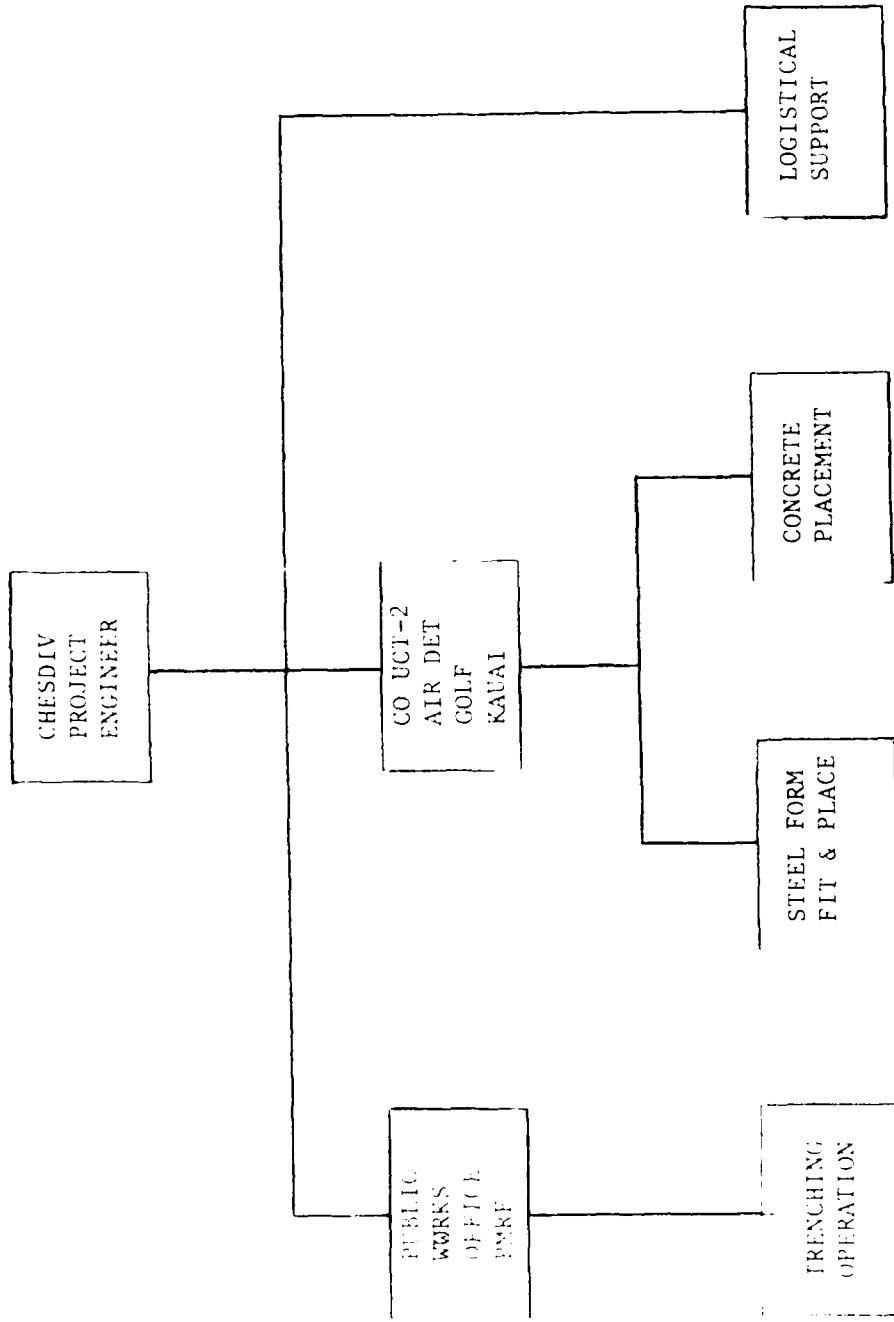


Figure 3  
Installation and Operations Organization

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4.3 Personnel Assignments

Project personnel assignments are shown in Appendix B.

Project execution responsibilities are as follows:

- \* CHESNAVFACENGCOM Project Engineer. Provides overall project direction. Provides coordination of project execution activities with PMRF personnel.
- \* UCT-2 Air DetGolf - Project Construction Agent. Responsible for executing all field construction activities required for project execution.
- \* Project Support Coordinator, PMTC/PMRF, Barking Sands. Responsible for coordinating project execution support requirements with PMRF.

## IV. CONSTRUCTION OPERATIONS PLAN

### 1.0 OPERATIONAL PROCEDURES OVERVIEW

Figure 1 depicted the pre-construction location of the cables prescribed to be encased. UQC #1 and UQC South Spare lay to the south of the concrete encasement. UQC North Spare passes through the concrete groin but is exposed for about 70' shoreward of where it exits the groin.

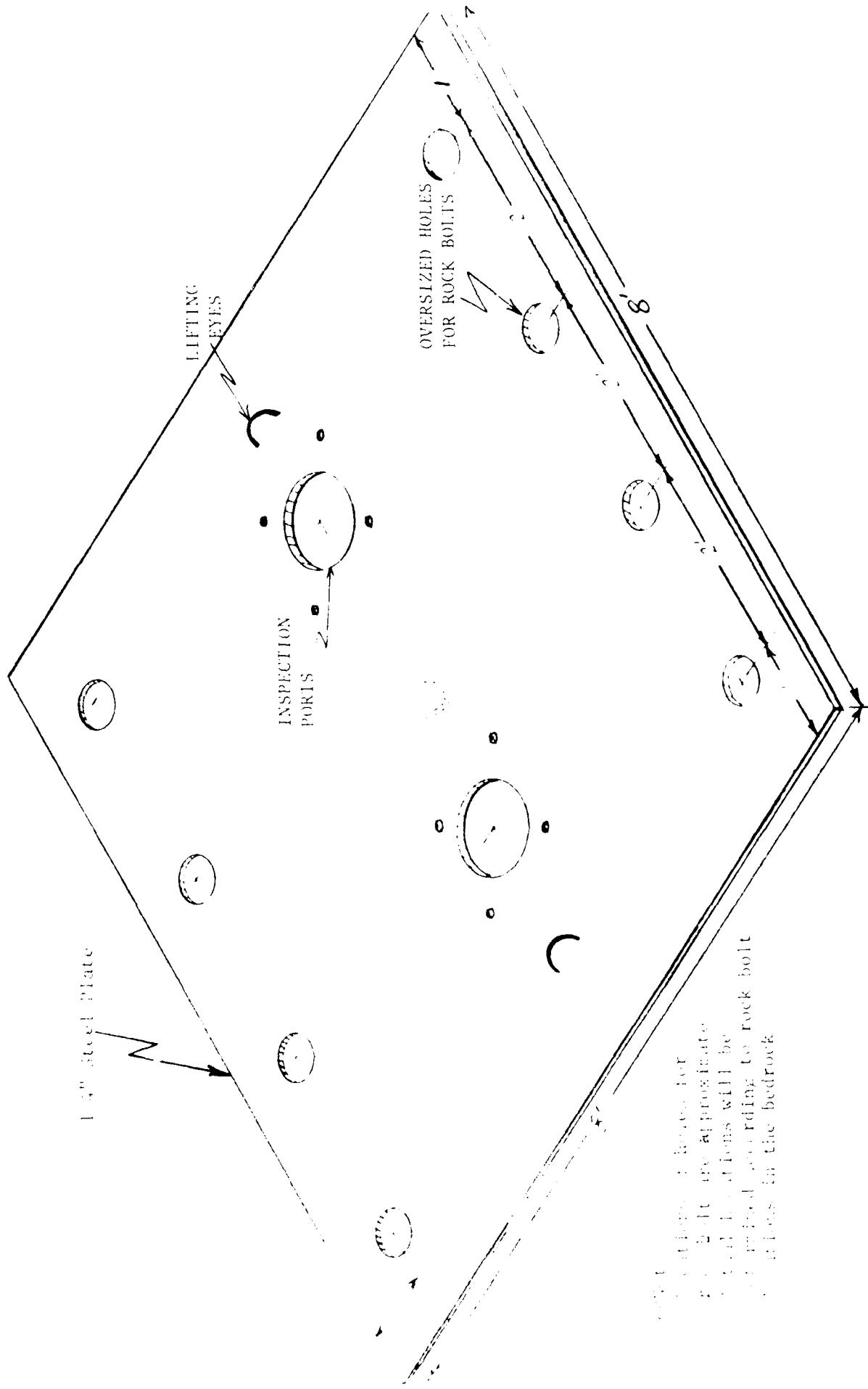
The repair project entails trenching into the bedrock beneath the split-pipe and installing rock bolts and reinforcing steel. The trench will then be filled with concrete.

#### 1.1. Pre-Construction Operations Requirements

##### 1.1.1 Steel Trench Covers

The trench covers were designed at CHESNAVFACENGCOM, the covers are shown in Figure 4. The covers will be used to cover the trench in the area where waves would cause mixing and separation of the concrete in the trench.

The covers will be fabricated by UCT-2 upon their arrival on site. Two 4'x 8'x 1/4" steel plates will be buttwelded to make an 8' square steel plate. At least three of these 8' square plates are needed. Padeyes will be fabricated and welded to the plate for lowering operations. Inspection ports and covers for these inspection ports will be cut and fabricated. The original design of the trench covers may be modified as topographic conditions dictate.



1/8" thick steel plate  
8' wide by 7' deep  
Rock bolt holes are approximately  
1 1/2" in diameter. Bolts will be  
driven into the bedrock  
approximately 12' from the bottom of the trench.

FIGURE 4  
TRENCH COVERS

1.2 CONSTRUCTION OPERATIONS

1.2.1 Moving Split Pipe

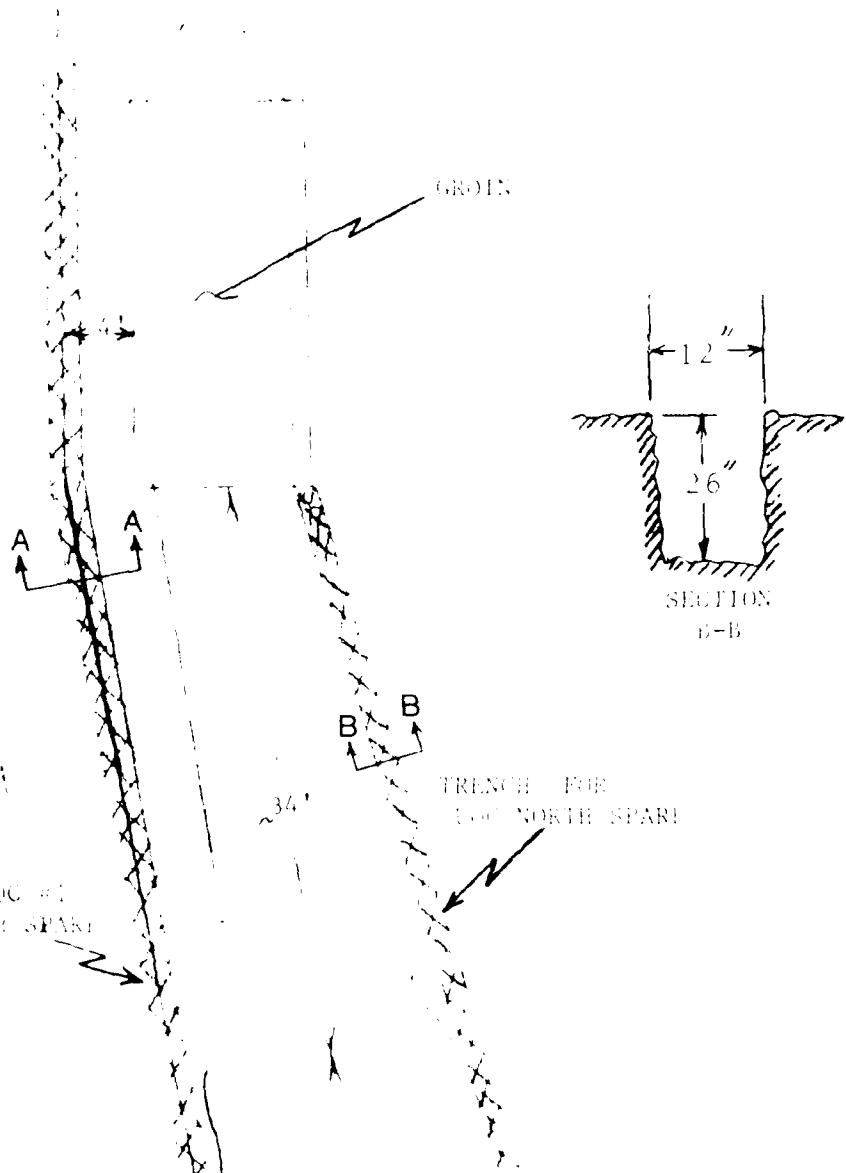
Before the trenching operation begins the split pipe encased cables will be secured on top of the groin. The ends of the cables shoreward of the concrete encasement will be unburdened from the sand to give the split pipe string some slack. A crane will be used to carefully pick up the split pipe and set it on the concrete encasement. The split pipe strings on either side of the trench will be lashed together on top of the encasement preventing either split pipe string from moving outward to the trenching area. Moving the split pipe allows the excavator access to the trenching area and reduces the risk of damage to the split pipe string by the excavator.

1.2.2 Trenching

PMRF via their base support contractor will provide the trenching equipment and operators. CHESNAVFACENGCOM project engineer will direct the trenching operation on site. The trenching operation will be executed by a track mounted hydraulically driven excavator. The trench will be cut to a minimum depth of 26 inches providing 18 inches of void space between the split pipe in the trench and the top of the trench. Figure 5 shows the proposed route of the trenches. After the trenches are cut the split pipe will be set in the trench.



TRENCH TO BE CUT  
ACROSS NARROW SPAN



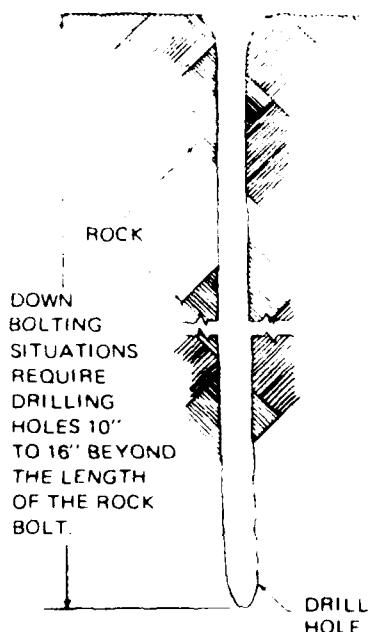
### 1.2.3 Setting Reinforcing Steel in Trench

A track mounted pneumatically driven rock drill will straddle the trench and drill the necessary holes at the edge of the trench for the rock bolts to immobilize the trench covers to the bedrock and inside the trench for the reinforcing rock bolts. Rock bolts 3/4" dia. will be installed every five feet within the trench and set by the procedure shown in Figure 6. The rock bolts after being set will have 6" of thread exposed. A re-bar extension will be secured to the rock bolt protruding from the bedrock through a threaded couple as shown in Step #4, Figure 6. The configuration of the re-bar in each trench is shown in Figure 7.

### 1.2.4 Preparation of Trench Covers

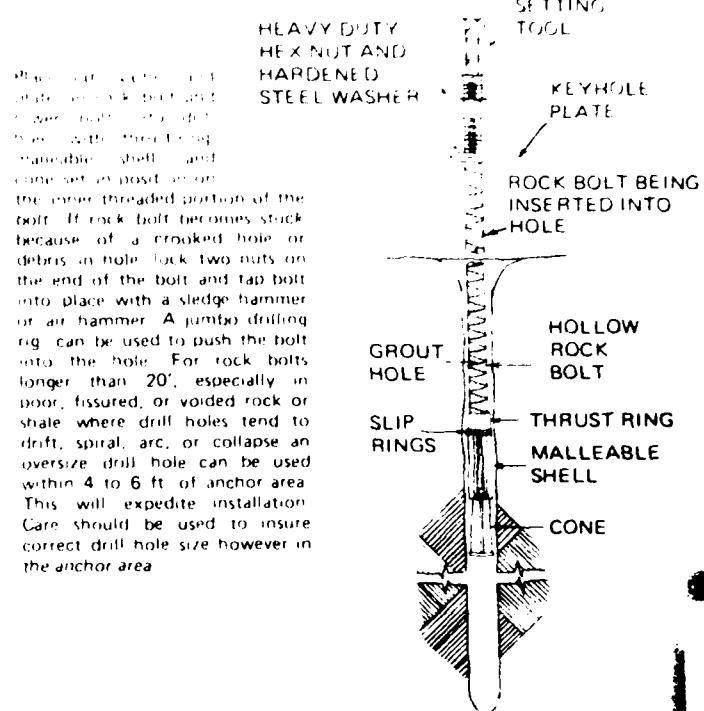
After the rock bolts have been installed adjacent to the trench the oversized holes will be cut into the steel trench covers to match the pattern of the rock bolts on the bedrock. Two or three inches of soft, pliable rubber will be glued on the underside of the steel plates around its perimeter. The rubber forms a gasket for the trench covers sealing the trench preventing sand intrusion and concrete from escaping during pumping operations.

## STEP #1 DRILLING

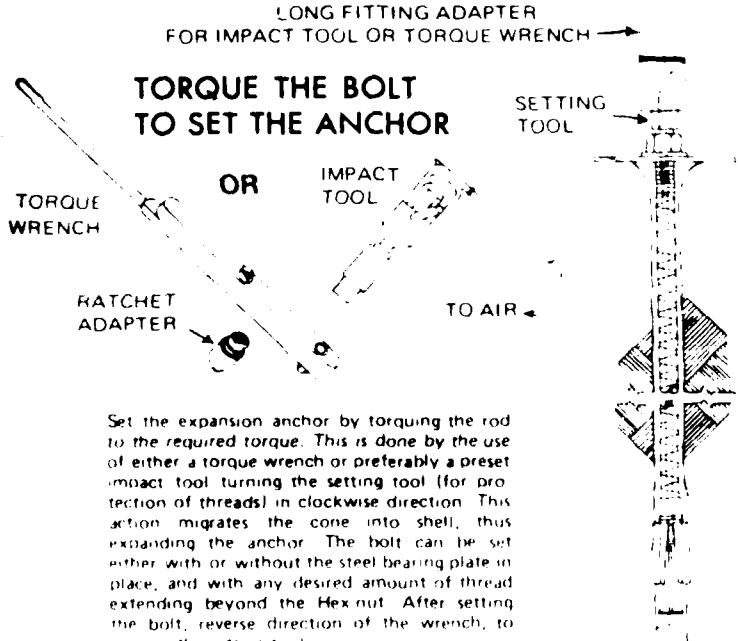


In down bolting situations, drill the holes to extend 10" to 16" beyond the length of the rock bolt. (Depending on field conditions - rock segments dropping into bottom of hole etc. Shallow concrete applications require only minimum clearance, 1" to 3" of overdrill). In up bolting situations, variations in the drill hole length up to 6" over the length of the rock bolt are immaterial. Care should be taken to insure an accurate diameter and a straight drill hole. Before inserting rock bolt, hole should be cleaned of cuttings, mud, etc.

## STEP #2 BOLT PLACEMENT



## STEP #3 TORQUING



Set the expansion anchor by torquing the rod to the required torque. This is done by the use of either a torque wrench or preferably a preset impact tool turning the setting tool (for protection of threads) in clockwise direction. This action migrates the cone into shell, thus expanding the anchor. The bolt can be set either with or without the steel bearing plate in place, and with any desired amount of thread extending beyond the Hex nut. After setting the bolt, reverse direction of the wrench, to remove the setting tool.

## STEP #4 RE-BAR EXTENSION

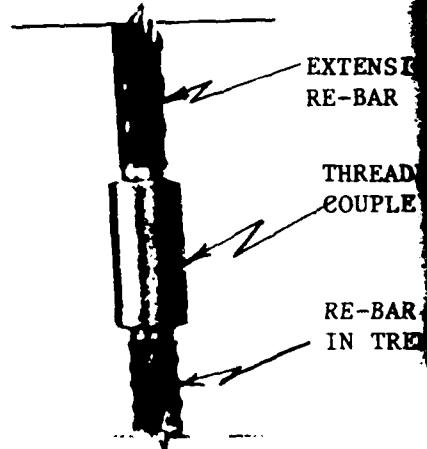
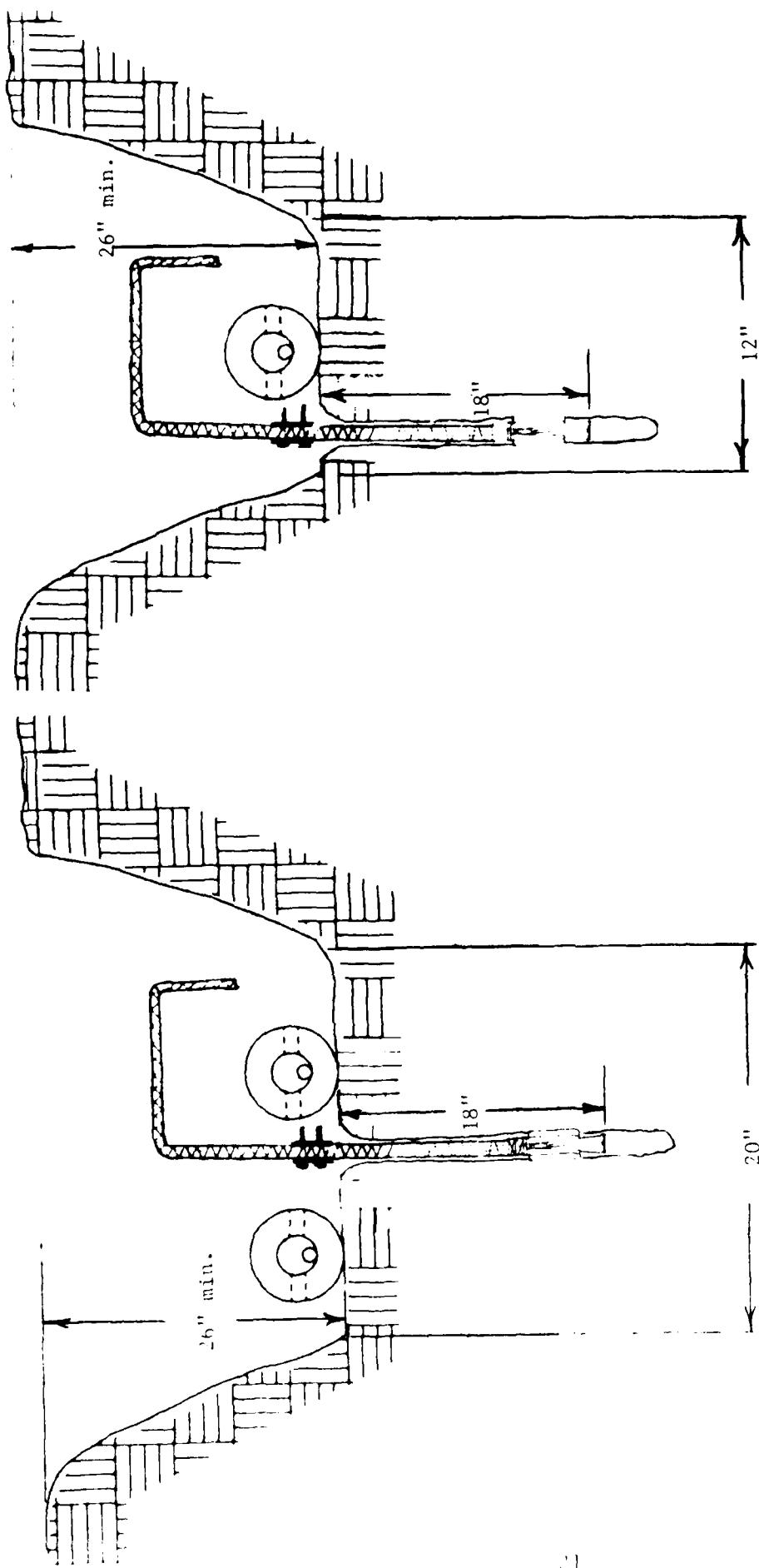


FIGURE 6  
ROCK BOLT INSTALLATION & EXTENSION RE-BAR



NORTH TRENCH

SOUTH TRENCH

FIGURE 7  
RE-BAR CONFIGURATION  
IN TRENCH

### 1.2.5 Placement of Trench Covers

The crane will lower the steel covers into place over their prescribed location. A tag line with one end tied to a padeye on the lower side of the plate and run through a padeye secured in the trench will be used to guide the plate into place over the rock bolts protruding from the bedrock.

As the trench cover sets on the bedrock the oversized holes will be covered with plates and the system will be tensioned down. This procedure is shown in Figure 8.

### 1.2.6 Trench End Covers

Trench end covers will be used at both ends of the trench where trench covers are used. The trench end covers overlap bolts spot welded on the trench covers as shown in Figure 9. The size, depth and width, of the trench end covers will be determined on site according the condition and dimensions of the trench at the exact location of where the trench covers will be used. Soft plyable rubber will be cemented to the edges of the end covers to seal the form preventing sand intrusion and concrete escaping from the form during concrete pumping operations. The shoreward trench end cover has an extra slot cut in it for the concrete supply line which was previously set in the trench see Figure 9.

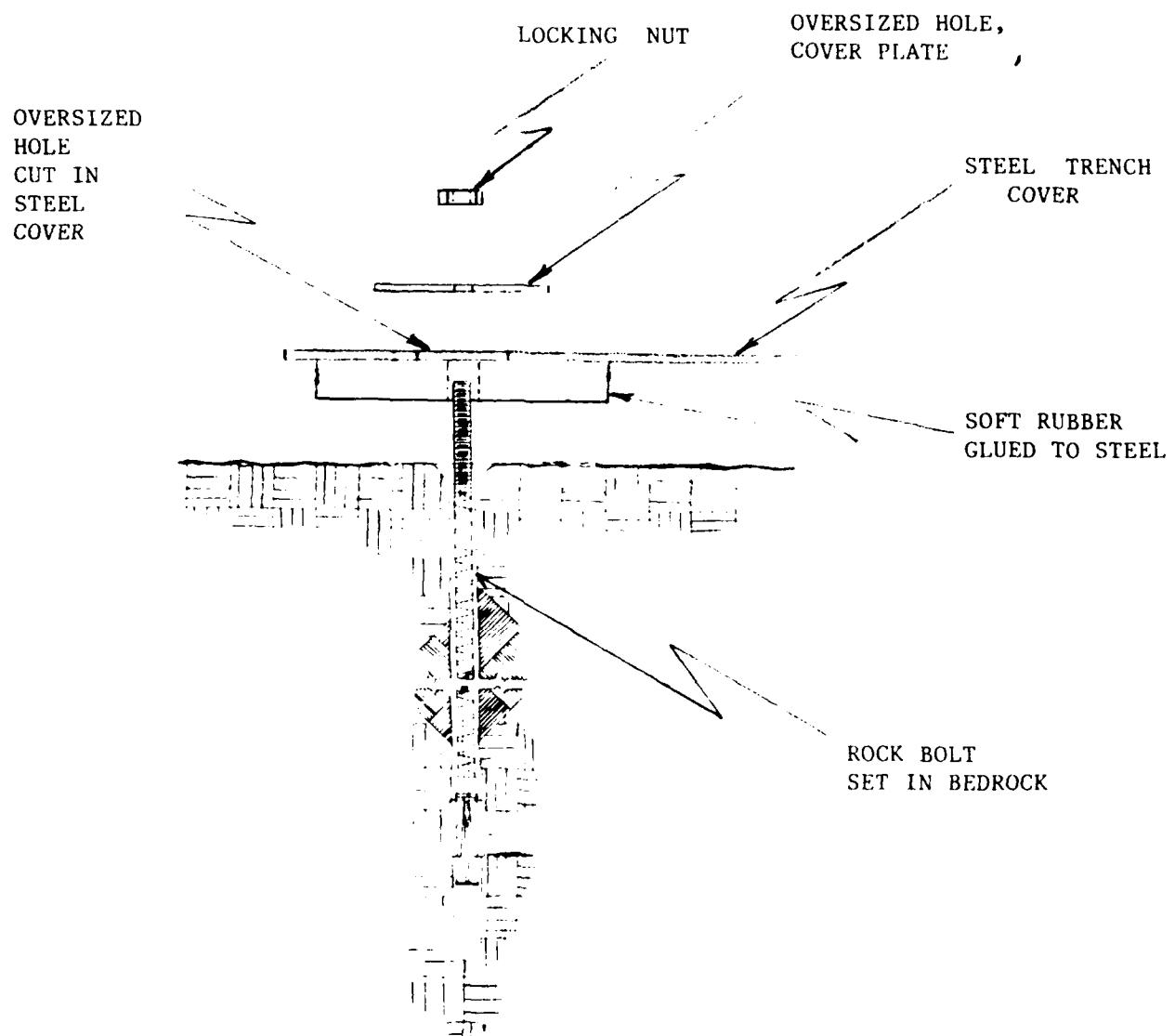


FIGURE 8  
STEEL TRENCH COVERS  
IMMOBILIZATION TO BEDROCK

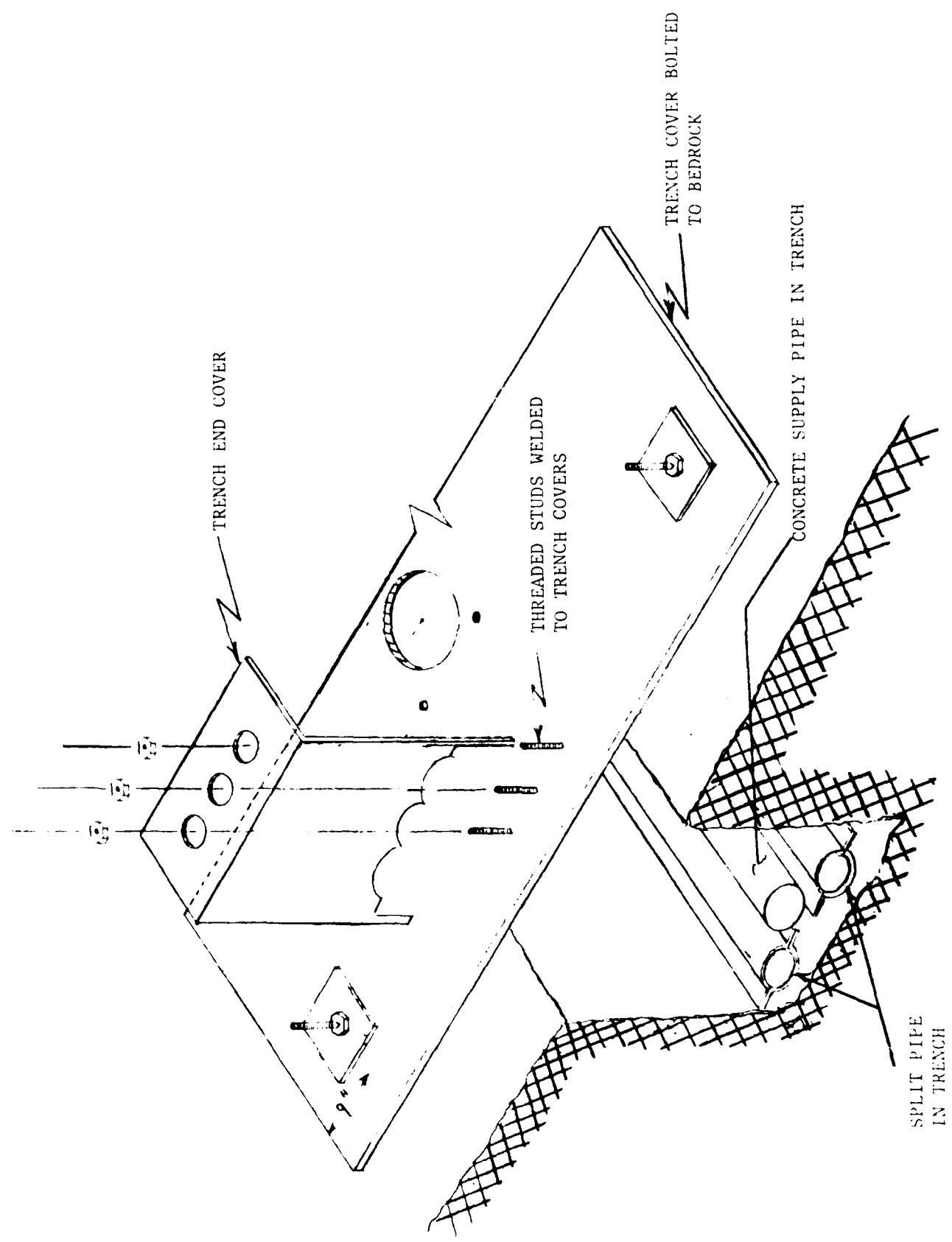


FIGURE 9  
TRENCH END COVER ASSEMBLY

#### 1.2.7 Concreting in Trench with Covers

Before concreting operations begin the trench will be washed with a continuous flow of water from a fire hydrant stand pipe to clear whatever sand is in place. After the trench end covers have been secured concrete will be pumped into the void space between the split pipe in the trench and the steel covers. Inspection holes which were cut into the cover provide an indication of how far the concrete has migrated up the trench. As an inspection port overflows the concrete supply line will be withdrawn about two feet to reduce the back pressure yet insure that the concrete is displacing the water.

#### 1.2.8 Concreting in Trench without Covers

After the seaward trench with covers has been filled with concrete the rest of the trench will be filled. The concrete will simply be pumped into the trench.

V. EXECUTION SCHEDULE

1 January - 15 January

1. Identify project equipment from NCF.
2. Prepare draft of Project Execution Schedule.
3. Finalize design.

15 January - 30 January

1. UCT-2/PMRF review Project Execution Schedule.
2. Determine trench route at BARSTUR.
3. Prepare Project Materials for shipment.

1 February - 30 February

1. Procure rock bolts.
2. Prepare final draft of the Execution Plan for approval.
3. Prepare Project Materials for shipment.

1 March - 15 March

1. CHESNAVFACENGCOM personnel depart Washington for Kauai.
2. Plan with concrete sub-contractor on logistics and concrete design.

17 March - 24 March

1. Trenching operation begins.
2. Main body UCT-2 arrive on site.
3. Fabricate trench covers and modify as necessary.

24 March - 31 March

1. Drill holes for reinforcing steel rock bolts and place

1 April - 3 April

1. Place trench covers in place.

4 April - 7 April

1. Pour Concrete in form.

8 April - 11 April

1. Clean up.
2. Prepare equipment for return to CONUS.
3. Project Personnel return.

21 April - 31 May

1. Prepare Project Completion Report.

2 June

1. Forward Project Completion Report.

APPENDIX A

Project Equipment/Materials

CHESDIV	UCT-2	PMRF
ROCK BOLTS	ROCK DRILL	BULLDOZER
CONCRETE PUMP	CUTTING TORCHES	CRANE
PLYABLE RUBBER	HYDRAULIC POWER UNIT	BACKHOE
RUBBER CEMENT	WOOD FOR CONC. PIPE	TRENCHING EQUIPMENT
	DRILL BITS	CONCRETE
	LIGHT PLANT	STEEL PLATE
	FIRE HOSE	REINFORCING STEEL
	NOZZLE	WELDING MACHINE
	DV SUP BRIEF CASE	CRAWLER DRILL
	FIRST AID KIT	
	ADMIN KIT	
	JACK HAMMER	
	ZODIAC	
	25 HP OUTBOARD MOTOR	
	IW06	
	IMPACT SOCKETS	
	PRC-77 RADIO	
	CAMERA KIT	
	SCUBA SET	
	BAND-IT TOOL	

## APPENDIX B

## PROJECT PERSONNEL

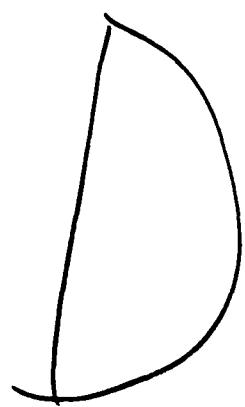
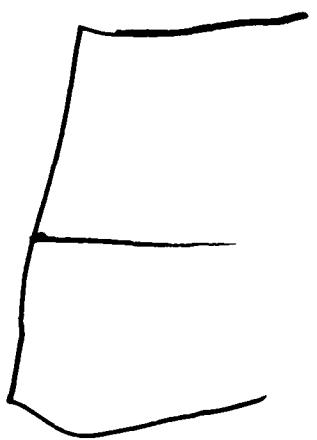
## UNDER WATER CONSTRUCTION TEAM TWO

NAME	GRADE
Turnwall, D.	LTJG (DV) OIC
Frank Valdez	SWC (DV) CPOIC
Barton, R.	BU1 (DV) APOIC
Voris, R.	CM1 (DV) SAFETY PO
Sutton, L	BU2 (DV)
Snell, J.	CE2 (DV)
Hornyak, P.	UT2 (DV)
Sako, S.	EO2 (DV)
Griffin, D.	CM1 (DV)

CHESNAVFACENGCOM

John A. Thornton

## Project Engineer



A hand-drawn outline of a large circle containing a vertical line. To the right of the circle, the letters "DTIC" are written in a cursive or handwritten style.

A hand-drawn outline of the number "7". To its right is a horizontal line, followed by the number "8". To the right of "8" is a small, separate oval shape.